tained at breakfast in the Zoological Gardens by the Royal Zoological Society, in the afternoon at a dinner by the College of Physicians, and in the evening at a *conversazione* by the Royal College of Surgeons. Their Graces the Duke and Duchess of Marlborough will also hold a reception in the Viceregal Lodge and entertain a number of distinguished visitors at dinner.

Several eminent visitors have already announced their intention of being present at the meeting, among others Messrs. Cornu, Chevalier, Brown-Sequard, Emile de Laveleye, Perier, Feil, Bertrand, Ranvier, Maas, Zirkel, Vogel, Salensky, Kanitz, Wittmael, Stricker, Cope, Sylvester, Draper, Sterry Hunt, H. M. Stanley, and Capt. Burnaby.

Through the unceasing labours of Dr. Ball the Royal Astronomer for Ireland, Dr. Norwood, and their co-secretaries, Dr. Sigerson and Mr. Goff, the meeting promises to be an unusually good one.

NOTES

MR. CHARLES DARWIN has been elected Corresponding Member of the Paris Academy of Sciences in the section of Zoology by 26 votes against 14. This success is all the more notable that Mr. Darwin obtained only 5 votes in a scrutiny which took place quite recently. Prof. Asa Gray has been elected a corresponding member in the Section of Botany in succession to the late Dr. Braun of Berlin.

AT the meeting of the French Association, of which M. E. Fremy will be president, M. Janssen will give a lecture on a question of physical astronomy, Prof. V. Trélat one on the Hospital, and Prof. Marey another on graphic researches relative to animated motors. Among the sectional papers promised are the following:—In the Mathematical Sciences, Signor V. Cerruti, of Rome, on the infinitely small movements of a solid body. In Physics and Chemistry, Prof. Crova on the solar heat; M. Ducretet on the liquefaction of gases; M. Janssen on new data obtained by photography on the constitution of the sun, and on the constitution of photographic spectra of short exposure; M. Montigny on the scintillation of the stars; M. Woeikoff on climatological researches. In Natural Science, Dr. Alix on myology of mammals; Dr. Baillon on the development of the ovular teguments; Dr. Blandet on geological periods before the secular variations; Prof. Chauveaux on the rate of propagation of excitations in the vaso-motor nerves; Prof. A. Gaudry on the evolution of primitive mammals; M. A. F. Nogues on method in geology, and on the climatology of geological times; Dr. Topinard on the notion of race in anthropology. Altogether there are about 250 papers already down to be read.

WE notice that the Bavarian Academy of Sciences at Munich at its last session elected to membership the famous French chemist Prof. Adolphe Wurtz, of Paris. Prof. Wurtz is at present engaged in a careful study of the more modern chemical laboratories of the German universities, preliminary to the completion of the plans for the new laboratory in connection with the École de Médecine at Paris. This structure will face on the new Boulevard de St. Germain, and its erection will require about five years. When completed it is expected that it will rank among the model laboratories of the world.

THE Berlin Academy of Sciences has elected to its membership the astronomer, Prof. Aubers, and the archæologist, Prof. Conze.

SOME improved forms of microphone and telephone are described in the August number of *Scribner's Monthly*. One form of telephone, as devised by Mr. Phelps, gives surprisingly good results. It contains two diaphragms, and in shape somewhat resembles a double crown. Twelve permanent magnets bent into a circular form are used in place of the single magnet employed in other magneto-telephones. Six of these on each side of the instrument have their like poles joined to one of the cores which carry the helices, and radiate from it in as many different directions. The opposite poles are joined to the periphery of the diaphragm on the corresponding side of the instrument, while the helices are so connected that the currents generated in them when the diaphragms are made to vibrate mutually strengthen each other and thus contribute to the effectiveness of the apparatus. Some idea of the performance of these improved instruments will be conveyed by mentioning the results obtained at a recent exhibtion of them in the Sunday-school room of Dr. Wells's church, Brooklyn. Mr. Edison's carbon transmitter was used for sending, and Mr. Phelp's crown telephone for receiving. The sound was also reinforced at the receiving end by the use of a large paper cone, whose smaller extremity was held to the mouthpiece of the instrument. The circuit extended from the residence of Dr. Wells, near the church, to the lecture-room. Speech from the telephone was distinctly heard in all parts of the room by an audience of about three hundred persons, while the singing of a vocal quartette, solo singing, and guitar playing, were transmitted with surprising clearness and loudness. It should be observed, moreover, that the performance in this case was very different from the so-called musical telephones by means of which only the pitch and rhythm of the notes are distinguished, the tone always resembling that of a penny trumpet. In this instance the quality of the tone, which is the real life of music, was exactly reproduced; this is one of the characteristics of the magneto-telephone—everything is faithfully reproduced. Dr. Wells addressed the audience from his parlours through the telephone, and not only was he clearly understood, but his voice was also instantly recognised.

THE observatory of the University of Jena, which occupies a romantic site in the garden where Schiller wrote his "Wallenstein," has been for three years unoccupied since the death of Prof. Schrön in 1875. By a recent appointment Prof. Abbe has been assigned to the chair of astronomy, and will commence active duties in the observatory.

THE seventeenth annual meeting of the Devonshire Association for the Advancement of Science, Literature, and Art, was held on July 30 and 31, and August 1, at Paignton. Mr. W. Froude, F.R.S., was the president-elect, but in consequence of the lamented death of his wife that gentleman was unable to discharge the duties of the office, and at the last moment Sir Samuel Baker, F.R.G.S., was chosen to fill the vacant place, and delivered an address upon the chief points of progress in the past half century. The list of papers was a very full one, thirty-four in all, including the reports of the various committees through whose action much of the work of the Association is now systematised. Thus there are committees at work upon the subjects of Devonshire meteorology, folk lore, celebrities, verbal provincialisms, Dartmoor, the Devon domesday, and for the collection of scientific memoranda of a miscellaneous character; and to these two others were added at Paignton, one to collect and to record facts relating to Devonshire barrows, and the other to perform a similar duty with regard to ancient and still existing manorial customs. Scientific papers predominated, and among these geological papers occupied the foremost place. Mr. Pengelly, F.R.S., contributed a fourth instalment of his collections of the literature of Kent's Cavern prior to the investigations of the British Association; a fifth set of "Notes on recent Notices of the Geology and Palæontology of Devon;" and papers on "The Geology of the North-Eastern Coasts of Paignton;" "Cetacean Remains found in Torbay;" and a second instalment of "Notes on Slips (*i.e.*, blunders of various writers) connected with Devonshire." Mr. W. A. E. Ussher, F.G.S. (Geological Survey), read papers on "The Geology of Paignton," and "The Mouth of the River Exe;" Mr. R. N. Worth, F.G.S., "On the Origin of the Ossiferous Deposits at Oreston;" Mr. A. R. Hunt, F.G.S., "Notes on Torbay," the Rev. W. Downes "On the Fossils of the Culm Measures about Holcombe Regis," while Mr. E. Parfitt contributed another important instalment to his fauna of Devon—a list of the *Lepidoptera*. There were several other papers of a more general character. Some of the papers gave rise to lively discussions, and incidental to one by Mr. Ussher, Mr. Champernowne, F.G.S., entered upon a brief exposition of his views of the Devonian question. The whole of the papers read will appear in the *Transactions*. The membership of the Society continues highly satisfactory, approaching 400.

AFTER a lapse of some twenty years the Oreston quarries have yielded another ossiferous fissure, the contents of which were removed under the direction of Mr. R. N. Worth, F.G.S., and will be deposited in the museum of the Plymouth Institution. The quantity of remains is not large, and they are almost wholly of *Bos* and *Cervus*, but the find is valuable inasmuch as it adds to the Oreston cave fauna the Aurochs (*Bison priscus*) and Great Irish Elk (*Megaceros*), and thus reduces the points of difference between the Kent's Hole fauna and that of Oreston. The relics of the Aurochs include a very fine horn core in an excellent state of preservation.

IN its last session the Municipal Council of Paris voted a sufficient sum to defray the expenses of a laboratory for the detection of adulterations in articles of food, a want the necessity of which has long been felt. At the same session 6,000 francs was appropriated for the purchase of tickets to the Exhibition, to be placed at the service of the teachers of the city.

THE Royal Archæological Institute commenced its annual meeting this year at Northampton on Tuesday last week. Lord Talbot de Malahide, president of the Society, presided, and congratulatory addresses were read from the municipality, the local clergy, and Architectural Society. Lord Malahide then vacated the chair in favour of the Ven. Lord Alwyne Compton, president of the Northampton meeting, who delivered an address. The week was devoted to visits to places of archæological and historical interest and to sectional meetings.

THE British Medical Association commenced its forty-sixth annual meeting at Bath on Tuesday, when it was calculated that upwards of 1,000 members were present. The proceedings commenced in the morning with Divine Service at the Abbey. During the afternoon some business meetings were held, and in the evening Dr. Falconer, of Bath, the president for the year, delivered his opening address.

M. LEVERRIER established at the Paris Observatory a daily journal which published not only the warnings of the meteorological service, but also all the astronomical news of general interest. The separation principle having prevailed, the *Bulletin International* is now entirely devoted to meteorological purposes, and the Observatory has no means at its disposal for conveying to the public the observations it receives, except by the channel of daily papers. It was only by chance that information as to Watson's discovery of an intra-Mercurial planet was obtained by the papers from Admiral Mouchez. The Admiral is preparing to establish at the Observatory a course of lectures on astronomical observations during the winter months. During summer the pupils will be admitted to practise with instruments belonging to the establishment. The pavilion in the Paris Observatory in which has been placed the transit instrument given by M. Bischofsheim, will be called Bischofsheim Pavilion. Admiral Mouchez has decided that the public shall be admitted twice a month to the Paris Observatory instead of once as usual. Letters requesting admission are to be directed to the Secretary of the Observatory.

ON Sunday next a monument will be inaugurated at Chamounix to Jacques Balmat, who was the first to ascend Mont Blanc. The *fête* is due to the co-operation of the Geological Society of France and the French Alpine Club. The programme is a very brilliant one, comprising an ascent of Buet and various rejoicings at Chamounix.

THE Helvetic Society of Natural Sciences meets at Berne on August 12, 13, and 14.

THE monuments to Alexander and Wilhelm von Humboldt, the former by Prof. Begas, the other by Herr Otto, will soon be erected one on each side of the entrance gate to the Berlin University. Both monuments are in marble and the figures are represented in a sitting position.

SENOR RAIMONDY, one of the first scientific authorities of Peru, has just published a new work on the minerals of Peru which is specially intended for the use of those who wish to examine more closely the rich and valuable collection of Peruvian minerals sent to the Paris Exhibition.

WE recently referred to Dr. Siemens' idea that the Falls of Niagara might be utilised to supply industrial wants. This idea seems likely to be realised, as we learn that a company has been formed in America to make use of the Falls to transmit to Buffalo, twenty-two miles distant, a constant supply of compressed air, which it is expected will be used as a substitute for steam in the principal establishments at Buffalo.

AN earthquake is reported from Jenbach (Tyrol); it occurred on July 19, at 10.32 A.M., and lasted for ten seconds.

M. ELISÉE RECLUS, the eminent geographer, who had been sentenced to transportation for the part taken in the communistic troubles, but had his sentence mitigated to exile, has, by a recent decree of the President of the French Republic, been authorised to return to Paris.

THE great Trocadéro lift is in full operation. The number of persons that can be elevated at once is fifty. In a single day 1,200 persons have used it. The time required for ascending is about four minutes for an altitude of fifty-three metres. The velocity is rather great at first, but gradually diminishes, and is very slow at the end. The distance run is about $\frac{1}{10}$th of the elevation reached by the captive balloon.

THE ascent of the Giffard captive balloon was stopped on July 31, owing to the wind-pressure suddenly increasing to eighteen pounds per square yard. No attempt was made during the two following days, but the wind having diminished it ascended again on August 3, at two o'clock. The air was so humid that the balloon seen from the earth appeared almost lost in clouds. Various interesting observations have been made.

WE have received a specimen sheet of a catalogue of books and papers on Electricity and Magnetism, compiled by the late Sir Francis Ronalds, F.R.S., which will shortly be published by the Society of Telegraph Engineers. This catalogue, which contains more than 12,000 entries, and will probably extend to over 600 pages, is believed to include every important work and almost every paper which has been published upon the subject of Electricity and Magnetism up to the date of its author's death in 1873. It also forms a valuable catalogue of scientific works generally. Sir Francis Ronalds devoted the greater part of his lifetime to its compilation and in the formation of the valuable library now in the possession of this society. It is proposed, should the number of subscribers be sufficient to cover the extra cost for printing, &c., to issue a separate librarian's edition, printed on one side of the paper only, for the use of librarians. The price to subscribers of each copy in this form will be 20*s*., delivered post free in the United Kingdom, and plus the extra postage for abroad. The price of the catalogue in the ordinary form will be 16*s*. The importance of this enterprise, not only to science but to bibliography generally, need not be insisted on. Those interested should communicate with the Librarian of the Society, 4, Broad Sanctuary, Westminster, S.W.

A LARGE coal-field, we learn from the Sheffield *Daily Telegraph*, has just been opened out near Hemsworth, about seven miles from Barnsley. The thick or Barnsley seam of coal has been reached on the estate of Mr. Allott, at a depth of 635 yards from the surface. This proves that a well-known and valuable bed exists in what may be termed the largest unworked coalfield in the West Riding. The shaft is the deepest in South Yorkshire, and the field in which the seam is worked commences at its southern extremity close to the town of Nottingham, and extending through Derbyshire, proceeding along the margin of the limestone to Barnsley and the east of it and the Ashworth Rock. The great coal-field, which includes parts of Derbyshire, Yorkshire, and Notts, is the largest in England, and only 150 square miles less in area than that of South Wales, the extreme length being sixty-six miles. The southern boundary is new red sandstone, and the strata rise and cross out westward near Bradford and Leeds, and then turning to the east, disappear under the magnesium limestone. The thickness of the bed near Hemsworth is about eight feet, which may be considered as about the average in South Yorkshire, while at Shireoaks Colliery, near Worksop, it is little more than three feet. The new colliery will be able to raise, when fully opened out, more than 1,000 tons daily, so that there will be an addition to the coal-producing power of South Yorkshire of 400,000 tons a year.

THE possibility of keeping a manatee in a healthy state in an aquarium is fully proved by the good condition of that at Westminster. It arrived on June 20, and has increased in size and done well. The only other specimen brought alive to England lived at the Zoological Gardens from August 6 to September 7 only, in 1875. At Westminster the animal is in a glass tank above the level of the ground, and accessible on both sides, so that its movements, position in floating, &c., can be well seen.

THE *Times'* notice of Bank Holiday amusements speaks of the Nubian Camp at the Alexandra Palace as an educational entertainment. In this we quite agree, and hope that every success may attend such instructive exhibitions as this.

RESPECTING the tornado, by which Canton was visited on April 11, the Rev. John Chalmers writes to the London Missionary Society that after careful inquiry and personal observation, he concludes that the whirlwind did not extend much further than three miles, the average width of its path being about three hundred yards. But on the next two days there were several distinct whirlwinds of a similar character in the neighbourhood. Over the space above indicated the tornado seems to have equalled in force and destructive effect anything of the kind heard of in the West Indies.

IN our "Meteorological Notes," vol. xviii. p. 287, the name of Mr. Eliot, who is officiating for Mr. H. F. Blanford in India, during the absence of the latter, should have been quoted instead of that of Mr. Blanford, as the authority for the forecast of the monsoon referred to.

AN astronomical correspondent suggests that in Mr. Lockyer's Eclipse telegram last week the words "Corona probably photographed in Siam. Fluorescent eye-piece worked well," should read "Corona probably photographed; it seemed fluorescent. Eye-piece worked well." With respect to the place of "Vulcan" as observed by Watson, R.A. 8° 26′ should be R.A. 8h. 26m.

THE additions to the Zoological Society's Gardens during the past week include a Slow Loris (*Nycticebus tardigradus*) from Borneo, three Chinese Cranes (*Grus longirostris*) from China, presented by Mr. Theodore Hance; a Mexican Deer (*Cervus mexicanus*) from Mexico, presented by Mr. A. Scrutton; a Common Fox (*Canis vulpes*), European, presented by Mr. Athelston Riley; three Great Bustards (*Otis tarda*) from Spain, presented by Lord Lilford, F.Z.S.; a Tiger Bittern (*Tigrisoma brasilianea*) from South America, presented by Mr. Hammond Hawbyne; a Greater Sulphur-crested Cockatoo (*Cacatua galerita*) from Australia, presented by Mrs. A. A. Hole; a Passerine Owl (*Glaucidium passerinum*), a Bacha Eagle (*Spilornis bacha*) from Borneo, presented by Mr. J. S. Jameson; two Beisa Antelopes (*Oryx beisa*) from North-East Africa, a Brown Coati (*Nasua nasica*) from America, deposited; an Ocelot (*Felis pardalis*), a Black Vulture (*Cathartes atratus*) from America; two Chilian Sea Eagles (*Geranoaëtus melanoleucus*), a Brazilian Caracara (*Polyborus brasiliensis*) from South America, two Rufous Tinamous (*Rhynchotus rufescens*) from Brazil, nine Spotted Tinamous (*Nothura maculosa*) from Buenos Ayres, a Razor-Billed Curassow (*Mitua tuberosa*) from Guiana, purchased; an Axis Deer (*Cervus axis*), born in the Gardens.

THE PHONOGRAPH AND VOWEL-SOUNDS[1]

II.

IN our last communication we confined our attention to the letter ō. We will now turn to the letter ū (corresponding to *oo* in "food"). Fig. 2 shows a series of curves obtained for ū by the mechanical process already described. They are all

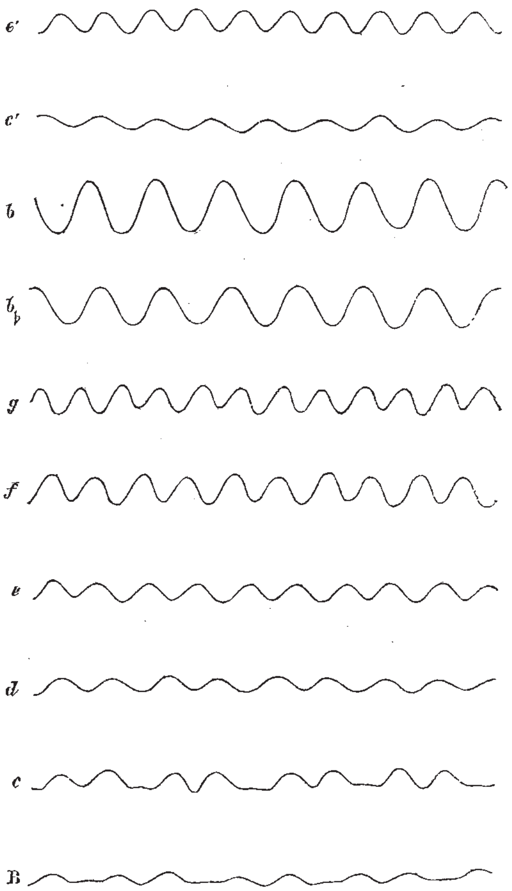

FIG. 2.—*Wave-forms of ū Sung by the same Voice at Various Pitches*

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[1] Continued from p. 343.